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Social Distancing Device Using Arduino UNO

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Abstract: The rapid transmission of COVID-19 has caused a global health crisis. Feeling uneasy after getting into contact with a guy who was already suffering from a contagious disease is not a good indication. As per the guidelines of the Ministry of Health and Family Welfare, the Government of India and World Health Organization, one of the primary ways to reduce the spread of the virus is to practice social distancing. Specifically, it is important to stay at least six feet away from others. However, it is difficult to implement this, and people can often forget to maintain this distance when they are in a public place. Nowadays many such devices are available in markets to maintain Social Distance but looking at the cost, they are too expensive and are not meeting all the demands, our solution to this problem is a cost-effective Social Distancing Device. This device consists of Infrared Sensor which is used for motion detection. The device is programmed with the use of Arduino so that when any two units come within six feet of each other, both units begin beeping, hence notifying both users with these devices to step away from each other. This prototype shows successful proof of concept, under constrained operating condition.

I. INTRODUCTION

A devastating worldwide health emergency is the coronavirus pandemic. Countries are attempting to halt the spread of the virus by restricting travel, outlawing big groups, and quarantining residents to reduce direct contact between people. Social isolation is one of the most effective techniques to stop the virus from spreading. Maintaining a physical barrier between oneself and other people is known as social distancing. It's crucial to keep a minimum of 6 feet between you and other individuals. However, it can be challenging to remember to keep this distance in a public setting, and individuals frequently transgress this distance limit.

The existence of the illness during the Covid-19 epidemic has prompted the investigation of several methods to slow its spread. These include identifying the risky area, monitoring employees' whereabouts, tracing contacts, identifying spreaders, monitoring Covid-19 symptoms, and other activities. utilized a cellular network to identify an area vulnerable to the transmission of Covid-19. In a further trial, contact tracking tools were utilized to carefully segregate any workers who had come into contact with Covid-19 while letting the rest of the staff to continue working. Despite posing privacy issues, the tool could also give workers more confidence about going to work.

In order to stop the spread of Covid-19, the World Health Organization (WHO) has advised that physical social distance be followed. Malaysia keeps a physical distance of at least 1 meter between people indoors and outside to prevent the spread of the virus. As of right now, the Covid-19 standard operating procedure (SOP) for open enterprises uses a mark of 1m distance to maintain people's safe separation from one another in diverse locations.

By using the proper, approved face mask, one may shield themselves from influence from others and vice versa. You should wear a mask so that your mouth and nose are completely covered. regular hand hygiene. For human use, an alcohol-based disinfectant is necessary to protect them against contamination. Touching frequent touch points like lift buttons might also make you more likely to become handicapped. Therefore, it's crucial to avoid contacting frequent touch areas and take other safety measures.

II. LITERATURE SURVEY PAPER-1

This study aims to develop an alert system which alerts employees to maintain social distance in corporate working environments. It uses real-time location systems (RTLS) based on ultra wide band (UWB) wireless technology to give accurate locations of approximately 10cm using trilateration and TDOA (Time Difference of Arrival). Co-ordinates of the location can be obtained by installing RTLS in predefined area which are used to calculate the distance between Mobile UWB Devices (MUD's). An alert triggered by a system to maintain distance if distance between the employees is less than the prescribed social distance can keep the work premises safe and control the spread of corona virus. The World Health Organization (WHO) has issued a set of safety measures to protect people from getting affected. These safety measures include wearing a certified face mask, regular sanitization, avoiding touching common touch points, and maintaining a safe social distance. Wearing a proper certified face mask will protect person A from others and vice versa from getting affected, and should be worn such that mouth and nose areas should be covered properly. Regular sanitization of hands with a proper alcohol based sanitizer is necessary for people to protect themselves. Avoiding common touch points like lift buttons can also increase chance of getting affected. Maintaining the safe social distance can protect individuals and can control the spread of virus. After lockdown period, companies are ramping up the process of bringing their employees to office to maintain their productivity by following standard operating procedures decided by the governments. However, not maintaining social distance can increase the chance of spread of virus especially in corporate environments.

III. LITERATURE SURVEY PAPER-2:

This paper presents a smart wearable device, Suraksha, that can be worn while travelling outside and will help maintain social distancing. It is a simple device which is easy to use and is built using basic electronic components. It is also capable of integrating with health applications over Bluetooth and support contact tracing. The Coronavirus that infects the respiratory system is from a family of viruses that range from the common cold virus to the MERS Corona virus, and the first case was reported in China on 31st December 2019. On March 11, 2020, the number of cases of CoVID-19 outside China and the west had increased thirteen-fold and the number of affected countries tripled, with more than 1,18,000 cases in 114 countries and 4,291 deaths. The only way to curb its menace is taking precautionary measures, such as maintaining a minimum distance of 1 to 1.5 meter between two individuals.

The Suraksha device is a wearable device capable of detecting the movement between individuals and triggering an alarm in the event of close proximity. It helps the user maintain a minimum physical distance from people and objects by sounding a buzzer alarm and LED whenever anyone comes within close proximity of the user. Narinder Singh Punn, Sanjay Kumar Sonbhadra and Sonali Agarwal propose a deep learning-based system for computerizing the work of observing social distancing using surveillance video. Cong T. Nguyen and Yuris Mulya Saputra present fundamental background about social distancing as well as effective technologies that can be used to facilitate the social distancing practice. This article is free to access and download, along with rights for full texformance and data mining, re-use and analysis.

The most important details in this text are that sensors connected to the Arduino can detect close objects, but the mean detection range of an ultrasonic sensor is from 15-30%. Abhiruchi Passi and Devdutt [10] explain another social distancing technique, an ID card based system, which uses the same Ultrasonic sensor to detect distance between individuals. The Vision Based Social Distancing Monitor designed by Rahul Khanna [11] is based on computer vision and uses a Raspberry Pi camera to detect human beings and then makes a virtual box around each person. However, the components used in this system are expensive making it less affordable and the system is based on monitoring other individuals and not for helping maintain one's own distance with others. Additionally, the system can be easily manipulated as the image detection system is fairly new and requires high security. Applications like the Aarogya Setu require a smartphone which may not be affordable by all and one is not portable.

IV. LITERATURE SURVEY PAPER-3:

This paper proposes an automatic social distancing and body temperature detection sensor that uses ultrasonic, and infrared thermometer sensors to maximize overall performance and restriction cost. The sensor is coupled with a buzzer to show and maintain the social Keep your distance from the individual coming into the door. An automated non-touch frame temperature measurement system is installed at the end of the entrance to check people's body temperature before they finally enter the area. With the growth of COVID-19 confirmed cases, the government is taking tighter precautionary measures.

The Arduino Uno is a sensor and buzzer that can be triggered when the sensed body temperature is higher than the normal value. As the world battles with the effect of COVID-19, organizations and governments are looking for approaches to securely restart worldwide trade and nearby economies to relieve the monetary effect of the infection. Social separating and contact following will be a significant component in any arrangement for the safe resuming of organizations and functional offices. In numerous workplaces, industrial facilities, and different working environments, keeping a safe actual separation turns into a unique issue in light of the fact that the vicinity between labourers is continually evolving.

The term "new normal" is used to describe the preventive measures that society must take to limit or prevent the threat of infectious diseases such as COVID19. This means that labourers will move quicker than others, and regular traffic bottlenecks will happen inside work environments that lead to nearer levels of actual vicinity than others. Structures are intended to help a consistent progression of individuals, but not many draftsmen might have imagined the requirement for a low thickness of traffic in common regions, doorways and ways out, halls, or other open spaces. The structure, despite how shrewd it could be, is not going to give the fundamental innovation to help social removing. Instead, it tumbles to new answers for give the appropriate response.

Scientists believe that at some point in the future, another virus is about to break out, so it is important to have precautionary measures geared up for deployment. Social distancing is a non-obtrusive measure that looks to forestall transmission of the airborne infection by keeping a set separation between and among individuals. Tracing is an powerful way of containing the unfold after figuring out an outbreak. Innovation to execute severe social distancing is the favoured technique in a bustling work environment, as it gives a robotized "consistently on" framework that ensures all specialists while staying as subtle as possible to the client.

The most important details in this text are the proposed system based on Arduino UNO, coronary heart beat sensor, Ultrasonic sensor, Temperature sensor and Buzzer. Arduino UNO is an open supply microcontroller card problem to the Microchip ATmega328P microcontroller made via way of means of the association. The sensors are coordinated with Arduino UNO and any of the sensors detects abnormality buzzer will make sound and the facts will be up to date with the web page through the usage of WIFI module.

The Aurdino UNO card is a hardware component that reduces facet and primary information/yield (I/O) pin social events. It has 14 stepped forward I/O pins (six with PWM yield work), 6 primary I/O sticks, and may be modified with Arduino IDE (Integrated Development Environment) thru USB Type B cable. It may be fuelled via way of a USB interface or an outside 9-volt battery, regardless of the manner that it could understand voltages. It resembles Arduino Nano and Leonardo and has been accredited as Creative Commons Attribution 2.5 license. Plan and assembling files are accessible for 2021 JETIR August 2021, Volume 8, Issue 8. Fig 1 shows a few system adaptations.

The Node MCU ESP8266 improvement board comes with the ESP-12E module containing the Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor helps RTOS and operates at 80MHz to one hundred sixty MHz adjustable clock frequency. Node MCU has 128 KB RAM and 4MB of Flash memory, and its excessive processing electricity with in-constructed Wi-Fi / Bluetooth and Deep Sleep Operating functions make it perfect for IoT projects. An ultrasonic sensor is an digital tool that measures the gap of a goal item with the aid of using emitting ultrasonic sound waves, and converts the contemplated sound into an electrical signal. Ultrasonic sensors have important components: the transmitter (which emits the sound the use of piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the goal).

V. LITERATURE SURVEY PAPER-4:

This text discusses two studies based on person detection in the region of interest (ROI). A study presented automatic control of power supply in the classroom, where motion detection was used as the main indication for detecting human presence. A study used RPi as the main component for controlling an automation system that is integrated with GSM for communication. Location-based person detection focused on addressing the habits of users who always leave the classroom without switching off fans, lights and air-conditioner, which lead to the excessive usage of electrical energy. The study proposed dividing the room into grids which control the lighting and fans in a particular area with human presence detection using Passive Infrared Technology (PIR) as the input and placed it in a grid fashion and each grid represents different electrical appliances.

This study proposed an RSSI-based human presence detection system for energy-saving automation. The RSSI is an indication for strength measurement of the transmitted signal by the access point. The system has a delay in the time response, where the module takes 40 seconds for 20 readings. Pattern noise elimination using image pre-processing technique was adopted to get better image quality and clarity. Background differencing was used to differentiate between the foreground and background which will detect the human body from the images taken.

The research was conducted to count the real-time number of passengers in the elevator car based on computer vision, image processing and human contour detection algorithm. Based on this study, counting human and detecting human presence can be implemented using this technique and it is suitable especially in the large area such as lecture hall and laboratory. The dataset used in this project is extracted from Caltech and ETH, internet, and authors own images. The location of the image taken is divided into two regions which are the road zone obtained from the road lane boundaries and the zone where should the pedestrian walk with the proposed walking human model. The method authors used in their research can be utilized in detection human presence based on the region classification which can be implemented in dividing the lecture hall and laboratory area.

The comparison is done with three different object detection algorithms used in the convolutional neural network: Single Shot Detector (SSD), Faster Region-based Convolutional Neural Network (Faster R-CNN). The authors used the Common Object in Context (COCO) dataset as the benchmark input. The experiment ran on NVIDIA Titan X graphic card, 32 GB of Random-Access Memory (RAM) and power up with Intel Xeon E5-1650 v2 processor. The frontier models test result showed that the faster model was SSD Mobile Net with a test dev mAP score of 19 and the most accurate model was Faster R-CNN Inception Resnet with a score of 34.2. The comparison of pre-trained models with various data sets is useful in determining which pre-trained model is suitable to be implemented for the proposed idea.

VI. LITERATURE SURVEY PAPER-5:

The novel generation of the coronavirus disease (COVID-19) was reported in late December 2019 in Wuhan, China and became a global outbreak in 2020. The World Health Organisation (WHO) announced the situation as pandemic on 8th October 2020, with 36 million infected people and a scary number of 1,056,000 deaths in 200 countries. There is still no effective cure or available treatment for the virus, and precautions are taken by the whole world to limit the spread of infection. Social distancing, as shown in Figure 1a, refers to precaution actions to prevent the proliferation of the disease, by minimising the proximity of human physical contacts in covered or crowded public places. The WHO believed that COVID-19 was only transmittable via droplets emitted when people sneeze or cough, but on 8 July 2020, the WHO announced that it is an airborne disease that can be spread by tiny particles suspended in the air after people talk or breathe, especially in crowded, closed areas.

Recent research has confirmed that people with mild or no symptoms may also be carriers of the novel coronavirus infection, and it is important to maintain controlled behaviours and observe social distancing. Figure 2 demonstrates the effect of following appropriate social distancing guidelines to reduce the rate of infection transmission among individuals. During the COVID-19 pandemic, governments have implemented a variety of social distancing practices, such as restricting travels, controlling borders, closing pubs and bars, and alerting the society to maintain a distance of 1.6 to 2 m from each other. However, monitoring the amount of infection spread and efficiency of the constraints is not an easy task. Artificial Intelligence can play an important role in facilitating social distancing monitoring, and Computer Vision has been successful in solving various complex health care problems and crowd monitoring.

This research aims to support the reduction of the coronavirus spread and its economic costs by providing an AI-based solution to automatically monitor and detect violations of social distancing among individuals. It develops a robust deep neural network (DNN) model for people detection, tracking, and distance estimation called Deep SOCIAL. It performs a live and dynamic risk assessment, by statistical analysis of spatio-temporal data from the people movements at the scene. The developed model can perform as a generic human detection and tracker system, not limited to social distancing monitoring, and can be applied for various real-world applications such as pedestrian detection in autonomous vehicles, human action recognition, anomaly detection, and security systems.

VII. LITERATURE SURVEY PAPER-6:

The author proposes an approach to estimating the distance between people to analyse whether social distancing is maintained. The YOLOv3 object detection framework is used to identify people in a given frame. The Mobile Net Single Shot Multibox Detector (SSD) object tracking model and the Open-CV library for image processing are used to detect people in regions of interest. The distance between the humans detected in the video footage is calculated and compared to a set of predetermined pixel values. When harmful distances between persons are detected, notifications or cautions can be sent out to maintain the distance safe.

The proposed system will operate in an efficient manner in the current situation when the lockout is eased and helps to track public places easily in an automated manner. The author has addressed in depth the tracking of social distancing and the identification of face masks that help to ensure human health.

The author has developed a smart wearable device that can detect social distancing between the group of peoples. The system consists of an ultrasonic sensor, a microcontroller, and a buzzer. The HC-SR04 ultrasonic sensor was used to detect the distance of any obstacle behind the person wearing the device. The transfer learning approach for performance optimization with a deep learning algorithm is used to automatically monitor people in public places with a camera integrated with a local machine and to detect people with mask or no mask. The process also involves the YOLOV3 Detector, a neural network architecture that has already been trained on a large collection of images such as Image Net and Pascal for high quality image classification.

The proposed system uses RTSP to stream video feeds from the Network Video Recorder (NVR) and calculate the distance between two people in the video. Transfer learning is used to create a lightweight model that is accurate and computationally efficient. The YOLOV3 model extracts a person mask and displays a bounding box. The Yolo Algorithm is used to detect the person using image processing and the Euclidean distance formula is used to calculate the pairwise distance between centroids. The distance between person and the person who are Violating Social Distancing will be counted and the person maintaining the social distance will also be counted.

The proposed system for university campuses estimates social distances by using BLE packets among dedicated mobile nodes, collecting their data on a monitoring server via a campus-wide wireless LAN. It was partially implemented using M5StickC devices and conducted fundamental evaluations for between-node BLE communications. The results confirmed that it is possible to roughly estimate distances by using average or red colour bounding boxes.

Conclusion:

The analysis and design of social distancing and alert system is presented. The proposed system is used to avoid unnecessary encounters between person to person. And also, this system used for security purpose of a person so that he or she can maintain a minimum distance of 6 feet. This paper involves avoiding encounter to unconsciousness through getting accumulate at a particular place. It's like the time when two person encounters each other after having the social distancing device wearing the ultrasonic sensors detect the presence and it's like violating the rule of getting closer to someone than maintain a 6 feet distance thus it will give a beep so it makes both persons aware. Thus, after developing such device it's really helps people from getting into the risk of getting affected from any ill person and also make society aware of following the rule of covid-19 and also its cheaper price and make it affordable to any human being.

VIII. REFERENCE:

- E. Waltz, "Back to Work: Wearables Track Social Distancing and Sick Employees in the Workplace as companies re-open employees may done wearable tech to prevent the spread of COVID-19", IEEE Spectrum, May 2020.
- L. Zhendgong, H. Shuai, L Zhaoyang, L. Weifeng and H. Daxi, "The ultrasonic distance alarm system based on MSP430F449", Measuring Technology and Mechatronics Automation, pp. 1249-1251, 2013.
- R. Alsaeedy and K. P. Chong, "Detecting Regions At Risk for spreading COVID-19 Using Existing Cellular Wireless Network Functionalities", IEEE Open Journal of Engineering in Medicine & Biology, pp. 187-189, 2020.
- Website on Ultrasonic Sensor. https://create.arduino.cc/projecthub/abdularbi17/ultrasonic-sensor-hc-sr04-with-arduino-tutorial-327ff6
- Website on Arduino UNO Board, https://www.arduino.cc/en/Main/arduinoBoardUno